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COLLEGE OF AGRICULTURE UNIVERSITY OF NEBRASKA
AGRICULTURAL EXPERIMENT STATION
RESEARCH BULLETIN 104

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Season of the Year on the Sex Ratio
of Calves and Services Required
for Conception**

R. F. Morgan and H. P. Davis
Department of Dairy Husbandry

LINCOLN, NEBRASKA
AUGUST, 1938

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Summary

The present study was based on records of the dairy herd of the University of Nebraska for the period 1896 to 1934, and covers five breeds, Holsteins, Jerseys, Guernseys, Ayrshires, and milking Shorthorns. In all, 2,090 cows have been included. The purpose was to determine the influence of the age of the bull, the age of the cow, and the season of the year upon the number of services required for conception, and to determine also the influence of these factors upon the sex ratio of calves born, number of twins born, and the percentage of abortion.

Young bulls under two years showed the smallest number of services for conception. From two years of age through eight years of age, the number of services required varied very little. There were not enough data for older bulls to permit conclusions.

Cows under two years of age (virgin heifers) required more services for conception than any age group of cows up to ten years of age. Between the ages of two and thirteen years, with the exception of the ten-year-old group, cows showed little variation in the number of services required for conception.

Among bulls of varying ages mated with cows of varying ages, the two-year-old bulls mated to two-year-old cows showed the smallest number of services for conception. Between the ages of two and eight, cows and bulls show little influence of age upon the number of services required. Bulls three years of age and older were not efficient when mated with females under two years of age. The average number of services required for conception for 2,090 cows was 3,041 for 1,375 conceptions, or 2.21 services for each conception. Among the calves there were 730 males and 628 females, together with 30 sets of twins and 47 of unknown sex. The sex ratio was 53.75 per cent males and 46.25 per cent females. The average percentage of abortion was 12.58.

During the season from May to October 2.28 services were required for conception, while from November to April 2.14 services were required for bulls of all ages mated to cows of all ages.

The monthly variation in number of services for conception varied from 1.94 in December to 2.86 in September. As far as the sex ratio was concerned, all months showed more males than females except November.

Influence of Age of Dairy Cattle and Season of the Year on the Sex Ratio of Calves and Services Required for Conception

R. F. MORGAN AND H. P. DAVIS

In the breeding of dairy cattle the use of proved sires is advocated as the surest method of improving the herd. While there are many definitions, the proved sire is most commonly defined as one that has first of all sired five or more unselected daughters, each of which has completed at least one production record, and that these cows have been out of different dams that have had comparable production records. The second step is a comparison of the records, which may or may not "prove" the bull.

The proved bull will never be less than four years of age and more often he will be six or seven years of age, and perhaps much older. The use of a mature bull, and especially a bull of seven years or older, entails certain difficulties and hazards, such as proper housing for safety, fertility of the bull, and disease control. Many breeders frankly state that their troubles with older bulls have been so many that they prefer to use and do use young bulls.

In an effort to determine the influence of age of bulls and cows in a dairy herd upon the number of services required for conception, the breeding records of the dairy herd at the University of Nebraska have been studied for a period of more than a third of a century. During the period the herd has suffered from Bang's disease (infectious abortion) up to about 1930, when this disease was eradicated from the herd. Definite evidences of trichomoniasis were discovered in 1936, and there is likelihood that this disease existed earlier. In other words, the dairy herd is a large herd that has been handled, as far as disease, feeding, and management are concerned, in accordance with the best practice. The four principal dairy breeds are represented—Holstein-Friesian, Jersey, Guernsey, and Ayrshire, and in the earlier years milking Shorthorns.

The general plan has been to use such pastures as were available and to use alfalfa hay and corn silage as the principal roughages. The grain mixtures fed have usually contained approximately 14 per cent digestible protein composed of ground corn, ground oats, wheat bran, and one or more of the following high-protein concentrates—cottonseed meal, linseed meal, fish meal, gluten meal, gluten feed, soybean meal. During the past ten years, one per cent of iodized salt, one per cent of steamed bone meal, and one per cent of lime flour have been added to the grain mixture. Molasses and dried beet pulp also have been used in the ration. For several years beginning in September, 1926, and ending May, 1931, oats sprouted for eight hours were fed to both cows and bulls.

REVIEW OF LITERATURE

White and associates (11) in studying the influence of infectious abortion (Bang's disease) upon the reproduction of a dairy herd, found that 1.82 services were required for conception with negative cows, 1.55 services for cows of doubtful reactions, and 2.09 services for reacting cows,

thus indicating the effect of that disease upon breeding. Some data were presented regarding the age of heifers at first breeding upon the number of services required for conception as follows:

Age of Heifer	Services per Heifer for Conception
Less than 15 months	2.40
15 to 17 months	1.91
18 to 20 months	1.60
21 to 23 months	2.54
24 months and over	2.89

In their study of 40 bulls the number of services for conception varied from 1.00 to 3.18, indicating that the individual bull is a prominent factor in this problem. Cows appeared to conceive more promptly within the first 60 days after calving. During the season from November to April 2.02 services were required for conception, while for the other six months, May to October, only 1.89 services were required.

Eckles (1) in a study of the dairy herd at the University of Minnesota for a period of 29 years, reported the number of services for conception to average 2.52. He says, "The data assembled bear out the usual opinion that abortion is a factor in sterility, although the effects of abortion in this respect are often over-emphasized. Of all aborting animals 21 per cent were sterile following abortion."

Fitch and associates (2) studied a clean herd of 33 animals and found that 1.7 services were necessary for each conception. In a herd of 16 infected with Bang's disease, 2.4 services were required for conception.

Moseley and associates (8) report that pasture for four months had no significant effect upon the percentage of cows conceiving at first service. Pasture appeared to have a slightly favorable effect in reducing the number of services for conception in cows bred more than three times. For all cows in the herd, 1.7 services were required for conception.

Gowen and Dove (3) in an analysis of records of 7,696 cows found that 60 per cent conceived at the first service, and that 95 per cent had conceived by the fifth service. There was a variation in the percentage of services that resulted in conception from a low of 55 in September to 64 in August, with no distinct effect of season. The effect of the age of the cow upon the services required for conception indicated a progressive increase from 70 per cent (1.428 services) for females under one year, to 45 per cent (2.222 services) for females 16 years of age. He indicates a steady decline in fertility with advancing age for both males and females.

Miller and Graves (6) in reporting on the health of a herd that had Bang's disease, state that before the infected animals were eliminated, 2.88 services were required for conception. After separation the negative cows required 2.92 services for each conception. If the services to sterile animals were included, the respective figures were 3.94 before separation, and 3.48 services for conception after separation. There is some reason to believe that this herd might have suffered from trichomoniasis. In figures presented to show the effect of season of the year upon fertility covering four years and 22 bulls, the lowest number of services, 2.44, were required

in December and May, while September showed 4.36 and July 4.28. Young bulls required 3.06 services for conception as compared with 3.83 for mature bulls.

Miller and associates (7) report that the number of services required for conception in positive cows when bred after normal calving was 2.63, while when bred after abortion the number was 3.20. They present a table to show the percentage of conception at each of a varying number of services.

Pearl (10) in reporting the effects upon sex of breeding early, in the middle, or late in oestrus found a total of 657 males and 656 females, or approximately an even sex ratio.

Nebraska data (9) based upon five breeds, Holstein-Friesian, Jersey, Guernsey, Ayrshire, and milking Shorthorn, with a total of 1,235 calvings, show 53.48 per cent males, 46.52 per cent females, and 1.54 per cent twins. This is a ratio of 114.94 males to 100 females.

Johansson (4) in a study of 124,000 births of Swedish Red and White, Swedish Friesian, Swedish Landrace, Finnish Ayrshire, and East and West Finnish Landrace breeds, found that the sex ratio was 106 males to 100 females. The age of the cow appeared to have no influence upon the sex ratio.

Knott (5) in a study of the gestation time of Holstein-Friesian cows shows that of 2,824 gestations of single births, 1,441 calves were males and 1,383 were females—a ratio of 51.02 per cent males to 48.98 per cent females, or 104.2 to 100. Of the 86 sets of twins, the sex ratio was 109.7 males to 100 females. Miller and associates (7) reported a sex ratio of 113.6 males to 100 females, with five sets of mixed twins.

INFLUENCE OF AGE ON SERVICES REQUIRED AND ON SEX RATIO OF CALVES

In compiling the data, the first study was made on the effect of the age of the bull, with cows of varying ages. The ages of the cows and bulls were those on the date of service which resulted in conception. The bulls were sorted according to age by years. Only fertile cows, as determined by subsequent calving, were included. Table 1 shows the data for bulls between the ages of 12 to 23 months inclusive, with cows varying in age from under two years to 18 years of age. The table shows the number of bulls used on the cows of different ages, the number of cows served, the number of services per cow, the number of conceptions, the number of services required for conception, the sex ratio in percentage for males and females, and other data.

A bull may appear more than once, if the same bull served cows of different ages. In successive tables the same cow may appear more than once, her appearance depending upon the age at which she was bred. To obtain the figures under the heading "services per cow, average number," the total number of services was divided by the number of cows served for a particular age of cow. To obtain the "services for conception, average number," the total number of services was divided

by the number of conceptions. In some cases, the sex of calves aborted was unknown, which accounts for the number of calves of unknown sex appearing in the table. The column showing the percentage of abortions is included in order to throw some light upon the effect of abortion upon the number of services required for conception.

Table 1 shows that the average number of services required in the case of bulls 12 to 23 months of age when breeding cows of varying ages was 1.94 and that there was a general trend toward more services for conception when bulls of this age were used to breed older cows. Tables 2 to 13 represent data for bulls of different ages. In general the trends are much the same as in Table 1. It is interesting to note that the male calves always exceeded the females in each table except Table 4, for bulls 48 to 59 months of age, and Table 12, for bulls 144 to 155 months of age. No reason is apparent.

Tables 1 to 13 are largely self-explanatory. Table 14 is a summary table. In that table the data for bulls of all ages when breeding cows of varying ages are presented. A total of 2,090 cows (not individuals) were served 3,041 times for 1,375 conceptions, or an average of 2.21 services per conception. In a total of 1,358 calves there were 730 males and 628 females, or 53.75 per cent males and 46.25 per cent females, or 116.24 males to 100 females. This is a slight increase in the proportion of males to females since the previous Nebraska data (9) were presented. This rate appears higher than others have obtained with no apparent reason. There does not appear to be a very definite trend in any direction as far as the number of services required for conception is concerned. Females under two years of age require more services for conception (2.52) than those of any other ages except those ten years of age (3.15). That is not considering the older ages, for which few data are available. It would appear therefore that between the ages of two and ten years there is little difference, as far as age of cow is concerned, in the number of services required for conception.

Table 15 presents data showing the effect of age of bull upon cows of all ages. For bulls under two years of age, 1.94 services were needed for conception, the lowest number of services for conception for bulls of any age. With the exceptions of bulls eight years or older, where the data are somewhat limited, there was a distinct trend toward more services with the increased age of the bull. This is illustrated in the column headed "Yearling bulls as a standard, variations in percentage." It appears that there is a tendency for older bulls to be less sure as breeders. There is little indication that abortion had any measurable effect upon the number of services required for conception. Complete data on the prevalence of abortion in the herd are given in reference 9.

Table 16 is an analysis of data presented in Tables 1 to 15. By reading across and down the table, the number of services required for conception for bulls of any age in breeding cows of any age can readily be determined. The summary at the bottom of the table is taken from the data in Table 15. The summary at the right is taken from Table 14.

It is evident from Table 14, or the last column of Table 16, that heifers under two years of age required more services for conception than females of older ages up to 10 years of age, when bred to bulls of all ages. When young bulls, yearlings and two-year-olds, served such females, the numbers of services required for conception were respectively 1.80 and 1.67 as compared with 2.52 for bulls of all ages. It would appear, therefore, that the use of young bulls on virgin heifers might be of considerable advantage. The number of services required for conception for four-year-old cows using five-year-old bulls was 1.36, the lowest figure for any group where there was a considerable number of cases. This is apparently due to the influence of the cow, since in Table 14 when bulls of all ages served four-year-old cows, the number of services required for conception, 1.97, was the lowest for any age where there was a considerable number of cases. In Table 15, five-year-old bulls showed an average number of services for conception of 2.26, which is not the lowest but about what might be expected from the trend from young to old bulls. The average number of services for conception for 2,090 cows was 2.21. The difference between the figures for the older ages of cows in the various columns and the figures in the last column may be explained as follows: A cow may be bred to a bull of a certain age but may not conceive, and later may be bred to another bull and conceive to the service of the second bull.

EFFECT OF SEASON OF YEAR ON NUMBER OF SERVICES AND ON SEX RATIO OF CALVES

It might be expected that season of the year would have some influence upon the number of services required for conception, especially in a climatic environment where pasture is ordinarily not available more than three or at the most four months. The influence of green growing crops on reproduction has been thought to be quite material. It seemed as if the division of the year into two seasons—summer represented by the months May to October, and winter represented by the months November to April—might reveal the effect of season.

Tables 17 to 20 present the effect of season upon the number of services required for conception and the sex ratio when bulls of varying ages were mated to cows of varying ages. Tables 17 and 18 contain data classified according to the ages of the bulls, for the two seasons. The average number of services required for bulls of different ages in breeding cows of all ages was 2.28 for the summer season, compared with 2.14 for the winter season. The proportions of male calves were 55.13 per cent in summer and 52.44 per cent in winter. The abortion rate in summer was slightly lower, 11.88 per cent, as compared with 13.24 per cent for the winter season.

Tables 19 and 20 present data classified according to ages of cows, and these data agree in averages with Tables 17 and 18. Here again is emphasized the fact that females under two years of age require distinctly more services than the average for cows of all ages or for any but extreme

ages. Table 19 shows that for the summer season 2.73 services were required for conception, as compared with 2.33 services during the winter season. Tables 17 and 18 show that bulls under two years and two-year-olds required fewer services in both summer and winter than older bulls at either season.

Table 21 presents the influence of season by months for cows of all ages served by bulls of all ages. Here there was a fairly even distribution of the 3,041 services. In the low month, March, there were 211 services and in the high month, December, there were 279. The conceptions varied by months from 84 in September to 144 in December, with a total of 1,375. The services required for conception varied from 1.94 in December to 2.85 in September; these were 51.61 and 35.14 per cent respectively. A possible explanation of the large number of services required for conception in August and September, namely 2.78 and 2.85 respectively, is that on the average these months are hot, and while September is not so hot as July there may be a cumulative effect upon the bulls or upon the cows. The reasons for the variations in February and March are not apparent. A possible explanation may be that domesticated dairy cattle still retain some of the characteristics of their remote ancestors as to periods of fertility. The influence of month of birth upon sex is illustrated in Table 21. Here November was the only month that the females born exceeded the males, the percentages being respectively 47.36 and 52.64. The animals dropped during November were conceived between January 23 and February 21. The largest proportion of males dropped was in the month of September, when the relation of males to females was 60.98 to 39.02 per cent. These calves were conceived between November 23 and December 22. There does not appear to be any evidence that the season of the year influenced the sex.

TABLE 1.—Data on bulls 12 to 23 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	47	121	164	1.36	91	1.80	48	41 ¹	53.93	46.06	78	14 ²	8.53
2 yrs.	23	49	63	1.29	34	1.85	16 ¹	18	47.05	52.94	31	4 ³	6.34
3 yrs.	23	41	53	1.29	25	2.12	15 ¹	11	57.69	42.30	25	1	4.00
4 yrs.	18	21	29	1.38	16	1.81	12 ¹	5	70.58	29.41	15	2	12.50
5 yrs.	13	22	28	1.27	16	1.75	7	9 ¹	43.75	56.25	15	2 ³	12.50
6 yrs.	15	18	24	1.33	13	1.85	8	5	61.53	38.46	12	1	7.69
7 yrs.	12	16	22	1.38	11	2.00	9	2	81.81	18.18	9	2	18.18
8 yrs.	10	12	17	1.42	9	1.89	4	5	44.44	55.55	8	1	11.11
9 yrs.	6	7	8	1.14	5	1.60	4	1	80.00	20.00	5	0	00.00
10 yrs.	9	12	21	1.75	6	3.50	3 ¹	4	42.85	57.14	5	2	33.33
11 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	0	00.00
12 yrs.	3	3	3	1.00	2	1.50	1	1	50.00	50.00	2	0	00.00
13 yrs.	2	2	3	1.50	1	3.00	1	0	100.00	....	1	0	00.00
14 yrs.	2	3	12	4.00	2	6.00	2	0	100.00	....	1	1	50.00
18 yrs.	1	1	2	2.00	0	0.00	0	0	....	....	....	....	....
Av. or total	.	329	450	1.38	232	1.94	130	103	55.79	44.20	208	30	12.93

¹ One set of twins.² Three calves of unknown sex.³ One calf of unknown sex.

TABLE 2.—Data on bulls 24 to 35 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	30	78	105	1.35	63	1.67	36 ¹	27 ¹	57.14	42.85	61	4 ²	6.34
2 yrs.	27	63	89	1.41	52	1.71	20	30 ¹	40.00	60.00	47	6 ³	11.53
3 yrs.	23	67	103	1.54	47	2.19	26	20	56.52	43.47	45	2 ⁴	4.25
4 yrs.	21	40	60	1.50	23	2.61	11	11	50.00	50.00	19	4 ⁴	17.39
5 yrs.	15	24	37	1.54	19	1.95	10	9	52.63	47.36	19	0	....
6 yrs.	15	24	33	1.38	14	2.36	8	4	66.66	33.33	11	3 ²	21.42
7 yrs.	12	20	30	1.50	13	2.31	9	4	69.23	30.76	12	1	7.69
8 yrs.	8	12	14	1.17	9	1.56	5	4	55.55	44.44	8	1	11.11
9 yrs.	9	12	17	1.42	7	2.43	6 ¹	2	75.00	25.00	7	1	14.28
10 yrs.	5	7	11	1.57	5	2.20	4	1	80.00	20.00	4	1	20.00
11 yrs.	4	5	10	2.00	4	2.50	3	1	75.00	25.00	4	.	....
12 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
13 yrs.	1	1	2	2.00	1	2.00	0	1	....	100.00	1	.	....
Av. or total	.	354	512	1.45	258	1.98	138	115	54.54	45.45	239	23	8.91

¹ One set of twins² Two calves of unknown sex.³ Three calves of unknown sex.⁴ One calf of unknown sex.

TABLE 3.—Data on bulls 36 to 47 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Services	Services per cow	Conceptions	Services for conception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abortions	Abortions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	20	71	110	1.55	37	2.97	16	21	43.24	56.75	31	6	16.21
2 yrs.	27	60	86	1.43	46	1.87	22	25 ¹	46.80	53.19	40 ¹	7	15.21
3 yrs.	22	56	76	1.36	42	1.81	20 ¹	20	50.00	50.00	37 ¹	6 ³	14.28
4 yrs.	25	50	66	1.32	39	1.69	20	21 ²	48.78	51.21	38	3	7.69
5 yrs.	15	23	37	1.61	17	2.18	12 ¹	6	66.66	33.33	14 ¹	4	23.52
6 yrs.	15	25	40	1.60	18	2.22	13	4	76.47	23.52	14	4 ⁴	22.22
7 yrs.	14	26	30	1.15	19	1.58	11	8	57.89	42.10	16	3	15.78
8 yrs.	9	14	24	1.71	8	3.06	4	3	57.14	42.85	6	2 ⁴	25.00
9 yrs.	11	17	23	1.35	11	2.09	6 ¹	6	50.00	50.00	12	.	....
10 yrs.	3	4	5	1.25	2	2.50	1	1	50.00	50.00	1	1	50.00
11 yrs.	4	5	6	1.20	4	1.50	2	2	50.00	50.00	4	.	....
12 yrs.	3	3	3	1.00	2	1.50	1	1	50.00	50.00	2	.	....
13 yrs.	1	2	4	2.00	1	4.00	0	1	....	100.00	1	.	....
16 yrs.	1	2	9	4.50	.	....	.	.	....	....	.	.	....
17 yrs.	1	1	1	1.00	.	....	.	.	....	....	.	.	....
Av. or total	.	359	520	1.45	246	2.11	128	119	51.82	48.17	216	36	14.63

¹ One set of twins.² Two sets of twins.³ Three calves of unknown sex.⁴ One calf of unknown sex.

TABLE 4.—Data on bulls 48 to 59 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Services	Services per cow	Conceptions	Services for conception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abortions	Abortions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	20	72	111	1.54	40	2.78	18 ¹	19	48.64	51.35	34 ¹	7 ³	17.50
2 yrs.	20	46	65	1.41	28	2.32	13	14 ¹	48.14	51.85	23	6 ⁴	21.42
3 yrs.	23	39	58	1.49	28	2.07	15	14 ²	51.72	48.27	27	3 ⁵	10.71
4 yrs.	14	22	34	1.55	15	2.27	6	9	40.00	60.00	14	1	6.66
5 yrs.	17	28	39	1.39	22	1.77	14	7	66.66	33.33	18	4 ⁵	18.18
6 yrs.	12	19	31	1.63	15	2.07	3	11	21.42	78.57	10	5 ⁵	33.33
7 yrs.	13	17	28	1.65	11	2.55	5 ¹	5	50.00	50.00	8	4 ⁴	36.36
8 yrs.	10	17	31	1.82	12	2.58	4	8	33.33	66.66	11	1	8.33
9 yrs.	5	7	9	1.29	4	2.25	2	1	66.66	33.33	3	1 ⁵	25.00
10 yrs.	4	5	7	1.40	1	7.00	0	1	....	100.00	1	0	....
11 yrs.	6	9	12	1.33	3	4.00	3 ¹	1	75.00	25.00	4	0	....
12 yrs.	4	5	8	1.60	4	2.00	2	1	66.66	33.33	3	1 ⁵	25.00
13 yrs.	2	3	7	2.33	.	....	.	.	....	....	.	.	....
14 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	0	....
17 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	0	....
18 yrs.	1	1	1	....	.	....	.	.	....	....	.	.	....
Av. or total	.	292	443	1.52	185	2.39	87	91	48.87	51.12	158	33	17.83

¹ One set of twins.² Two sets of twins.³ Four calves of unknown sex.⁴ Two calves of unknown sex.⁵ One calf of unknown sex.

TABLE 5.—*Data on bulls 60 to 71 months of age and cows 2 to 18 years—all seasons.*

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	17	45	72	1.60	24	3.00	14	10	58.33	41.66	22	2	8.33
3 yrs.	17	35	47	1.34	23	2.04	10	12	45.45	54.54	20	3 ²	13.04
4 yrs.	13	20	25	1.25	13	1.92	9 ¹	5	64.28	35.71	14	.	....
5 yrs.	12	17	19	1.12	14	1.36	10 ¹	5	66.66	33.33	14	1	7.14
6 yrs.	11	21	27	1.29	11	2.45	9 ¹	3	75.00	25.00	12	.	....
7 yrs.	8	11	14	1.27	5	2.80	2	2	50.00	50.00	4	1 ²	20.00
8 yrs.	10	18	27	1.50	13	2.08	4	9	30.76	69.23	12	1	7.69
9 yrs.	7	8	9	1.13	6	1.50	3	3	50.00	50.00	6	.	....
10 yrs.	4	5	5	1.00	2	2.50	0	2	....	100.00	1	1	50.00
11 yrs.	6	12	22	1.83	6	3.67	1	5	16.66	83.33	6	.	....
12 yrs.	1	1	1	1.00	1	1.00	1 ¹	1	50.00	50.00	2	.	....
13 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	.	....
14 yrs.	1	1	2	2.00	1	2.00	0	1	....	100.00	1	.	....
Av. or total	.	195	271	1.39	120	2.26	64	58	52.45	47.54	115	9	7.50

¹ One set of twins.² One calf of unknown sex.TABLE 6.—*Data on bulls 72 to 83 months of age and cows 2 to 18 years—all seasons.*

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	13	42	59	1.40	20	2.95	9	8	52.94	47.05	17	3 ²	15.00
3 yrs.	14	32	49	1.53	12	4.08	7	5	58.33	41.66	11	1	8.33
4 yrs.	14	30	47	1.57	22	2.14	13	10 ¹	56.52	43.47	21	2	9.09
5 yrs.	14	22	37	1.68	17	2.18	5 ¹	12	29.41	70.58	16	2 ²	11.76
6 yrs.	8	14	18	1.29	10	1.80	3	5	37.50	82.50	8	.	....
7 yrs.	6	9	13	1.44	6	2.17	4	2	66.66	33.33	5	1	16.66
8 yrs.	7	16	25	1.56	9	2.78	5	3	62.50	37.50	8	1 ³	11.11
9 yrs.	8	14	25	1.79	8	3.13	6	1	85.71	14.28	7	1 ³	12.50
10 yrs.	3	3	4	1.33	4	1.00	1	2	33.33	66.66	2	2 ²	50.00
11 yrs.	5	5	9	1.80	4	2.25	4	0	....	100.00	4	0	....
12 yrs.	6	9	14	1.56	7	2.00	5	2	71.42	28.57	7	0	....
13 yrs.	1	1	1	1.00	1	1.00	0	0	....	....	0	1 ³	100.00
Av. or total	.	197	301	1.53	120	2.51	62	50	55.35	44.64	106	16	13.33

¹ One set of twins.² Three calves of unknown sex.³ One calf of unknown sex.⁴ Two calves of unknown sex.

TABLE 7.—Data on bulls 84 to 95 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under	8	56	84	1.50	21	4.00	12	8	60.00	40.00	19	2 ²	9.52
2 yrs.	8	37	45	1.27	21	2.14	11	10	52.38	47.61	21	.	....
3 yrs.	8	20	31	1.55	13	2.38	3	11 ¹	21.42	78.57	12	2	15.38
4 yrs.	6	13	21	1.62	8	2.63	5	3	62.50	37.50	7	1	12.50
5 yrs.	6	14	19	1.29	9	2.00	5	3	62.50	37.50	7	2 ²	22.22
6 yrs.	4	10	14	1.40	5	2.80	4	1	80.00	20.00	5	.	....
7 yrs.	3	3	4	1.33	2	2.00	1	1	50.00	50.00	2	.	....
8 yrs.	5	6	7	1.17	4	1.75	2	2	50.00	50.00	3	1	25.00
9 yrs.	5	9	14	1.56	6	2.33	3	3	50.00	50.00	6	.	....
10 yrs.	2	3	5	1.67	1	5.00	1	0	100.00	....	1	.	....
11 yrs.	3	4	4	1.00	3	1.33	1	1	50.00	50.00	1	2 ²	66.66
12 yrs.	2	3	5	1.67	1	5.00	0	1	....	100.00	1	.	....
Av. or total	.	178	252	1.42	94	2.68	48	44	52.17	47.82	85	10	10.63

¹ One set of twins.² One calf of unknown sex.

TABLE 8.—Data on bulls 96 to 107 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under	5	10	16	1.60	3	5.33	0	3	....	100.00	2	1	33.33
2 yrs.	5	18	27	1.50	14	1.93	10	4	71.42	28.57	13	1	7.14
3 yrs.	5	12	14	1.17	7	2.00	4	3	57.14	42.85	7	.	....
4 yrs.	5	10	14	1.40	8	1.75	7	1	87.50	12.50	8	.	....
5 yrs.	4	7	12	1.71	5	2.40	4	1	80.00	20.00	5	.	....
6 yrs.	2	8	9	1.13	6	1.50	6 ¹	1	85.71	14.28	6	1 ¹	16.66
7 yrs.	2	5	5	1.00	4	1.25	1	3	25.00	75.00	4	.	....
8 yrs.	2	2	2	1.00	1	2.00	0	1	....	100.00	1	.	....
9 yrs.	1	2	3	1.50	1	3.00	1	0	100.00	....	1	.	....
10 yrs. ....	.	.	.	....	.	....	.	.	....	....	.	.	....
11 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
12 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
Av. or total	.	76	104	1.37	51	2.04	33	19	63.46	36.53	49	3	5.88

¹ One set of twins.

TABLE 9.—*Data on bulls 108 to 119 months of age and cows 2 to 18 years—all seasons.*

Age of cow	Bulls	Cows served	Ser-vices	Services per cow	Con-ceptions	Services for con-ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor-tions	Abor-tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	2	5	11	2.20	2	5.50	2	0	100.00	....	2	.	....
2 yrs.	1	2	3	1.50	1	3.00	1	0	100.00	....	1	.	....
3 yrs.	1	3	6	2.00	1	6.00	0	1	....	100.00	.	1	100.00
9 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	.	....
Av. or total	.	11	21	1.91	5	4.20	4	1	80.00	20.00	4	1	20.00

TABLE 10.—*Data on bulls 120 to 131 months of age and cows 2 to 18 years—all seasons.*

Age of cow	Bulls	Cows served	Ser-vices	Services per cow	Con-ceptions	Services for con-ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor-tions	Abor-tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	1	13	29	2.23	4	7.25	1	3	25.00	75.00	4	.	....
2 yrs.	1	7	14	2.00	5	2.80	4	1	80.00	20.00	3	2	40.00
3 yrs.	1	6	12	2.00	4	3.00	2	2	50.00	50.00	3	1	25.00
4 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	.	....
10 yrs.	1	1	3	3.00	1	3.00	1	0	100.00	....	1	.	....
Av. or total	.	28	59	2.11	15	3.93	9	6	60.00	40.00	12	3	20.00

TABLE 11.—Data on bulls 132 to 143 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	3	9	17	1.89	7	2.43	3	4	42.85	57.14	6	1	14.28
2 yrs.	1	4	6	1.67	4	1.50	3	1	75.00	25.00	2	2	50.00
3 yrs.	3	7	9	1.29	6	1.50	4	2	66.66	33.33	4	2	33.33
4 yrs.	1	3	3	1.00	3	1.00	3	0	100.00	....	3	.	....
5 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
10 yrs.	1	1	1	1.00	.	....	.	.	....	....	.	.	....
Av. or total	.	25	37	1.48	21	1.76	13	8	61.90	38.09	16	5	23.80

TABLE 12.—Data on bulls 144 to 155 months of age and cows 2 to 18 years—all seasons.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	2	11	18	1.64	6	3.00	2	4	33.33	66.66	5	1	16.66
2 yrs.	3	12	15	1.25	8	1.88	5	3	67.50	37.50	8	.	....
3 yrs.	1	4	8	2.00	2	4.00	1	1	50.00	50.00	2	.	....
4 yrs.	2	5	7	1.40	3	2.33	1	2	33.33	66.66	2	1	33.33
5 yrs.	1	3	8	2.67	2	4.00	1	1	50.00	50.00	1	1	50.00
10 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
Av. or total	.	36	57	1.58	22	2.59	10	12	45.45	54.54	19	3	13.63

TABLE 13.—*Data on bulls 156 to 167 months of age and cows 2 to 18 years—all seasons.*

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under													
2 yrs.	1	4	7	1.75	1	7.60	1	0	100.00	0	1	.	....
2 yrs.	2	3	3	1.00	2	1.50	1	1	50.00	50.00	1	1	50.00
4 yrs.	1	1	1	1.00	1	1.00	1	0	100.00	....	1	.	....
5 yrs.	1	1	1	1.00	1	1.00	0	1	....	100.00	1	.	....
6 yrs.	1	1	2	2.00	1	2.00	1	0	100.00	....	1	.	....
Av. or total	.	10	14	1.40	6	2.33	4	2	66.66	33.33	5	1	16.66

TABLE 14.—*Data on bulls of all ages and cows of varying ages—all seasons.*

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions	Unknown sex
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.	No.
Under														
2 yrs.	114	537	803	1.50	319	2.52	162 ¹	149 ¹	52.25	47.47	282	41	12.85	13
2 yrs.	104	368	512	1.39	250	2.05	123 ³	124 ²	49.79	50.20	221	33	13.20	7
3 yrs.	88	305	442	1.45	210	2.10	112 ²	100 ⁴	52.83	47.16	197	20	9.52	5
4 yrs.	76	205	292	1.42	148	1.97	82 ¹	69 ²	54.30	45.69	133	15	10.13	2
5 yrs.	56	158	226	1.43	113	2.00	65 ³	46 ¹	58.55	41.44	101	15	13.27	5
6 yrs.	47	125	180	1.44	83	2.17	49 ³	30	62.02	37.97	68	16	19.27	5
7 yrs.	47	121	171	1.41	82	2.09	45 ³	35	56.25	43.75	71	12	14.63	3
8 yrs.	40	85	129	1.52	57	2.26	28	27	50.90	49.09	50	7	12.28	2
9 yrs.	34	63	84	1.33	41	2.05	24 ¹	17	58.53	41.46	38	5	12.19	2
10 yrs.	27	51	85	1.67	27	3.15	15 ³	13	53.57	46.42	24	4	14.81	0
11 yrs.	21	35	49	1.40	24	2.01	15 ³	10 ³	60.00	40.00	24	2	8.33	1
12 yrs.	13	18	23	1.28	13	1.77	5	6	45.45	54.54	11	2	15.38	2
13 yrs.	6	8	16	2.00	3	5.33	1	2	33.33	66.66	3	0	0	.
14 yrs.	3	4	13	3.25	3	4.33	3	0	100.00	....	2	1	33.33	.
16 yrs.	1	2	9	4.50	0	0	0	0	....	....	0	0	0	.
17 yrs.	1	2	2	1.00	1	2.00	1	0	100.00	....	1	0	0	.
18 yrs.	2	3	5	1.67	1	5.00	0	1	....	100.00	1	0	0	.
Total	.	2090	3041	...	1375	...	730	628	...	...	1232	173	...	47
Average	.	...	...	1.46	...	2.21	...	...	53.75	46.25	...	...	12.58	..

¹ Two sets of twins.² Three sets of twins.³ One set of twins.⁴ Four sets of twins.

TABLE 15.—*Service records of bulls of varying ages, with cows of all ages.*

Age of bull	Bulls	Cows served	Services	Services per cow	Conceptions	Services for conception	Yearling bulls as a standard variation	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abortions	Abortions
	No.	No.	No.	Av. no.	No.	Av. no.	P. ct.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.
Under														
2 yrs.	185	329	450	1.37	232	1.94	...	130 ¹	103 ¹	55.79	44.20	208	30 ⁴	12.93
2 yrs.	171	354	512	1.44	258	1.98	2.32	138 ²	115 ²	54.54	45.45	239	23 ⁵	8.77
3 yrs.	171	359	520	1.45	246	2.11	8.97	128 ¹	119 ¹	51.82	48.17	216	36 ⁴	14.26
4 yrs.	153	292	443	1.52	185	2.39	23.46	87 ¹	91 ¹	48.87	51.12	158	33 ⁶	17.27
5 yrs.	108	195	271	1.39	120	2.26	16.45	64 ²	58 ²	52.45	47.54	115	9 ⁷	7.25
6 yrs.	99	197	301	1.53	120	2.51	29.34	62 ³	50 ³	55.35	44.64	106	16 ⁸	13.11
7 yrs.	60	178	252	1.42	94	2.68	38.21	48	44 ³	52.17	47.82	85	10 ⁹	10.52
8 yrs.	33	76	104	1.37	51	2.04	5.15	33 ³	19	63.46	36.53	49	3	5.76
9 yrs.	5	11	21	1.91	5	4.20	116.60	4	1	80.00	20.00	4	1	20.00
10 yrs.	5	28	59	2.11	15	3.93	102.83	9	6	60.00	40.00	12	3	20.00
11 yrs.	10	25	37	1.48	21	1.76	-10.10	13	8	61.90	38.09	16	5	23.80
12 yrs.	10	36	57	1.58	22	2.59	33.57	10	12	45.45	54.54	19	3	13.63
13 yrs.	6	10	14	1.40	6	2.33	20.16	4	2	66.66	33.33	5	1	0
Total .....	.	2090	3041	...	1375	...	...	730	628	...	...	1232	173 ¹⁰	...
Average .....	.	...	...	1.46	...	2.21	...	...	...	53.75	46.25	...	...	12.58

¹ Three sets of twins.² Two sets of twins.³ One set of twins.⁴ Five calves of unknown sex.⁵ Nine calves of unknown sex.⁶ Thirteen calves of unknown sex.⁷ Two calves of unknown sex.⁸ Ten calves of unknown sex.⁹ Three calves of unknown sex.¹⁰ Forty-seven calves of unknown sex.TABLE 16.—*Services per cow required for conception—cows and bulls of varying ages.*

Age of cow	Age of bull at time of service in months													All ages bulls
	12-23	24-35	36-47	48-59	60-71	72-83	84-95	96-107	108-119	120-131	132-143	144-155	156-167	
	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Under														
2 yrs.	1.80	1.67	2.97	2.78	3.00	2.95	4.00	5.33	5.50	7.25	2.43	3.00	7.00	2.52
2 yrs.	1.85	1.71	1.87	2.32	2.04	4.08	2.14	1.93	3.00	2.80	1.50	1.88	1.50	2.03
3 yrs.	2.12	2.19	1.81	2.07	1.92	2.14	2.38	2.00	6.00	3.00	1.50	4.00	...	2.11
4 yrs.	1.81	2.61	1.69	2.27	1.36	2.18	2.63	1.75	...	1.00	1.00	2.33	1.00	1.97
5 yrs.	1.75	1.95	2.18	1.77	2.45	1.80	2.00	2.40	...	...	1.00	4.00	1.00	2.00
6 yrs.	1.85	2.36	2.22	2.07	2.80	2.17	2.80	1.50	...	...	...	...	2.00	2.17
7 yrs.	2.00	2.31	1.58	2.55	2.08	2.78	2.00	1.25	...	...	...	...	...	2.09
8 yrs.	1.89	1.56	3.00	2.58	1.50	3.13	1.75	2.00	...	...	...	...	...	2.26
9 yrs.	1.60	2.43	2.09	2.25	2.50	1.00	2.33	3.00	1.00	...	...	...	...	2.05
10 yrs.	3.50	2.20	2.50	7.00	3.67	2.25	5.00	...	...	3.00	...	1.00	...	3.15
11 yrs.	1.00	2.50	1.50	4.00	1.00	2.00	1.33	1.00	...	...	...	...	...	2.01
12 yrs.	1.50	1.00	1.50	2.00	1.00	1.00	5.00	1.00	...	...	...	...	...	1.77
13 yrs.	3.00	2.00	4.00	...	...	...	...	...	...	...	...	...	...	5.33
14 yrs.	6.00	...	...	1.00	...	...	...	...	...	...	...	...	...	4.33
17 yrs. ....	...	...	...	1.00	...	...	...	...	...	...	...	...	...	2.00
18 yrs. ....	...	...	...	...	2.00	...	...	...	...	...	...	...	...	5.00
Total bulls...	185	171	171	153	108	99	60	33	5	5	10	10	6	2090
Total cows...	329	354	359	292	195	197	178	76	11	28	25	36	10	cows
Av. all ages	1.94	1.98	2.11	2.39	2.26	2.51	2.68	2.04	4.20	3.93	1.76	2.59	2.33	2.21

TABLE 17.—Data on influence of season—bulls of different ages, cows of all ages—Summer, May to October.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions	Unknown sex
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.	No.
Under														
2 yrs.	48	171	249	1.46	114	2.18	69 ¹	44	61.06	38.93	103	13	11.40	3
2 yrs.	39	203	289	1.42	150	1.93	78 ¹	70	52.70	47.29	143	9	6.00	4
3 yrs.	34	182	261	1.43	116	2.25	56	58 ¹	49.12	50.87	101	17	14.65	4
4 yrs.	29	131	209	1.60	83	2.52	48 ¹	36 ²	57.14	42.85	74	14	16.86	4
5 yrs.	19	80	116	1.45	46	2.52	29 ³	18 ³	61.70	38.29	45	3	6.52	1
6 yrs.	20	88	141	1.60	55	2.56	27	21	56.25	43.75	47	8	14.54	7
7 yrs.	12	78	124	1.43	46	2.70	19	26 ³	42.22	57.77	42	5	10.86	2
8 yrs.	7	38	51	1.34	24	2.13	16	8	66.66	33.33	23	1	4.16	.
9 yrs.	2	2	3	1.50	1	3.00	0	1	....	100.00	0	1	100.00	.
10 yrs.	1	14	31	2.21	6	5.17	3	3	50.00	50.00	4	2	33.33	.
11 yrs.	3	19	30	1.58	16	1.88	12	4	75.00	25.00	11	5	31.25	.
12 yrs.	3	19	24	1.26	12	2.00	5	7	41.66	58.33	10	2	16.16	.
13 yrs.	2	5	8	1.60	4	2.00	3	1	75.00	25.00	4	0	0	.
Av. or total	219	1039	1536	1.48	673	2.28	365	297	55.13	44.86	607	80	11.88	25

¹ Two sets of twins.² Three sets of twins.³ One set of twins.

TABLE 18.—Data on influence of season—bulls of different ages, cows of all ages—Winter, November to April.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions	Unknown sex
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.	No.
Under														
2 yrs.	52	158	201	1.27	118	1.70	61 ¹	59 ²	50.83	49.16	105	17	14.40	2
2 yrs.	38	151	223	1.48	108	2.06	60	45 ³	57.14	42.85	96	14	19.96	5
3 yrs.	40	177	259	1.46	130	1.99	72 ²	61 ¹	54.13	45.86	115	19	14.61	1
4 yrs.	29	161	234	1.45	102	2.29	39 ¹	55	41.48	58.51	84	19	18.62	9
5 yrs.	25	115	155	1.35	74	2.09	35 ¹	40 ¹	46.66	53.33	70	6	8.10	1
6 yrs.	19	109	160	1.47	65	2.46	35 ¹	29 ¹	54.68	45.31	59	8	12.30	3
7 yrs.	12	87	124	1.43	46	2.70	29	18	61.70	38.29	43	5	10.41	1
8 yrs.	5	38	53	1.39	27	1.96	17 ¹	11	60.71	39.28	26	2	7.40	0
9 yrs.	2	9	18	2.00	4	4.50	4	0	100.00	....	4	0	0	0
10 yrs.	1	14	28	2.00	9	3.11	6	3	66.66	33.33	8	1	11.11	0
11 yrs.	3	6	7	1.17	5	1.40	1	4	20.00	80.00	5	0	0	0
12 yrs.	3	17	33	1.94	10	3.33	5	5	50.00	50.00	9	1	10.00	0
13 yrs.	2	5	6	1.20	2	3.00	1	1	50.00	50.00	1	1	50.00	0
Av. or total	231	1051	1505	1.43	702	2.14	365	331	52.44	47.55	625	93	13.24	22

¹ One set of twins.² Three sets of twins.³ Two sets of twins.

TABLE 19.—Data on influence of season—cows of different ages, bulls of all ages—Summer, May to October.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions	Unknown sex
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.	No.
Under														
2 yrs.	87	257	402	1.56	147	2.73	83 ¹	59	58.45	41.54	128	21	14.28	7
2 yrs.	80	175	237	1.35	121	1.96	62 ²	58 ²	51.66	48.33	110	13	10.74	3
3 yrs.	65	157	234	1.49	120	1.95	52 ²	68 ³	43.33	56.66	113	11	9.16	4
4 yrs.	57	106	152	1.43	71	2.14	42	30 ¹	58.33	41.66	67	6	8.45	1
5 yrs.	43	82	118	1.44	58	2.03	34	22 ¹	60.71	39.28	50	9	15.51	3
6 yrs.	36	70	101	1.44	43	2.35	24	17	58.53	41.46	35	8	18.60	2
7 yrs.	32	60	86	1.43	36	2.39	19 ²	16	54.28	45.71	33	4	11.11	2
8 yrs.	26	37	61	1.65	23	2.65	14	8	63.63	36.36	21	2	8.69	1
9 yrs.	23	37	50	1.35	21	2.38	16 ²	6	72.72	27.27	21	1	4.76	0
10 yrs.	16	27	47	1.74	14	3.36	9 ²	6	60.00	40.00	14	1	7.14	0
11 yrs.	12	14	17	1.21	10	1.70	5	4	55.55	44.44	8	2	20.00	1
12 yrs.	6	9	11	1.22	6	1.83	2	3	40.00	60.00	5	1	16.16	1
13 yrs.	5	5	9	1.80	1	9.00	1	0	100.00	....	1	0	0	0
14 yrs.	2	2	8	4.00	2	4.00	2	0	100.00	....	1	1	0	0
16 yrs.	1	1	3	...	...	...	...	...	....	....	...	...	....	...
Total .....	.	1039	1536		673		365	297	...	...	607	80	....	25
Average .....	.	....	....	1.48	...	2.28	...	...	55.13	44.87	...	..	11.88	..

¹ Two sets of twins.² One set of twins.³ Three sets of twins.

TABLE 20.—Data on influence of season—cows of different ages, bulls of all ages—Winter, November to April.

Age of cow	Bulls	Cows served	Ser- vices	Services per cow	Con- ceptions	Services for con- ception	Male calves	Female calves	Ratio males	Ratio females	Living calves	Abor- tions	Abor- tions	Unknown sex
	No.	No.	No.	Av. no.	No.	Av. no.	No.	No.	P. ct.	P. ct.	No.	No.	P. ct.	No.
Under														
2 yrs.	83	280	401	1.43	172	2.33	79	89 ¹	47.02	52.97	154	20	11.62	6
2 yrs.	79	193	275	1.42	129	2.13	61	66 ¹	48.03	51.96	111	20	15.50	4
3 yrs.	63	148	208	1.41	90	2.31	60 ¹	32 ²	65.21	34.78	84	9	10.00	1
4 yrs.	46	99	140	1.41	77	1.82	40 ¹	39 ²	50.63	49.36	71	9	11.68	1
5 yrs.	37	76	108	1.42	55	1.96	31 ²	24 ²	56.36	43.63	51	6	10.90	2
6 yrs.	28	55	79	1.44	40	1.98	25 ²	13	65.78	34.21	33	8	20.00	3
7 yrs.	31	61	85	1.39	46	1.85	26	19	57.77	42.22	38	8	17.39	1
8 yrs.	27	48	68	1.42	34	2.00	14	19	42.42	57.57	29	5	14.70	1
9 yrs.	20	26	34	1.31	20	1.70	8 ²	11	42.10	57.89	17	4	20.00	2
10 yrs.	19	24	38	1.58	13	2.92	6	7	46.15	53.84	10	3	23.07	0
11 yrs.	17	21	32	1.52	14	2.29	10 ²	6 ²	62.50	37.50	16	0	0	0
12 yrs.	8	9	12	1.33	7	1.71	3	3	50.00	50.00	6	1	14.28	1
13 yrs.	3	3	7	2.33	2	3.50	0	2	....	100.00	2	0	0	0
14 yrs.	2	2	5	2.50	1	5.00	1	0	100.00	....	1	0	0	0
16 yrs.	1	1	6	6.00	.	...	...	...	....	....	...	...	....	...
17 yrs.	1	2	2	1.00	1	2.00	1	0	100.00	....	1	0	0	0
18 yrs.	2	3	5	1.67	1	5.00	0	1	....	100.00	1	0	0	0
Total .....	.	1051	1505		702		365	331	...	...	625	93	...	22
Average .....	.	....	....	1.43	...	2.14	...	...	52.45	47.55	...	..	13.24	..

¹ Two sets of twins.² One set of twins.

TABLE 21.—*Influence of season—cows of all ages bred to bulls of all ages.*

Months	Total services	Conceptions	Services for conception	Conceptions	Calves born		Calves born		Abortions	
					Males	Females	Males	Females		
	No.	No.	No.	P. ct.	No.	No.	P. ct.	P. ct.	No.	P. ct.
January ...	252	123	2.08	48.80	63 ¹	60 ²	51.22	43.78	18 ⁴	14.63
February ...	218	97	2.25	44.49	52 ¹	43 ¹	54.74	45.26	17 ⁵	17.52
March	211	110	2.46	40.59	58 ¹	51 ²	53.21	46.79	13 ⁵	11.81
April	251	116	2.16	46.21	64 ³	51 ¹	55.65	44.35	11 ⁴	9.48
May	251	114	2.20	45.41	61 ³	55 ²	52.54	47.41	9 ⁴	7.89
June	260	124	2.10	47.69	64	57 ³	52.89	47.11	13 ⁶	10.48
July	277	134	2.07	48.37	76 ²	59 ¹	56.30	43.70	14 ⁷	10.44
August	270	97	2.78	35.92	53 ¹	39	57.61	42.39	14 ⁶	14.43
September ...	239	84	2.85	35.14	50	32	60.98	39.02	11 ⁷	13.09
October	237	120	1.99	50.20	61 ¹	55 ¹	52.59	47.41	19 ⁶	15.83
November ...	234	112	2.09	47.86	54 ²	60 ¹	47.36	52.64	8 ⁸	7.14
December ...	279	144	1.94	51.61	74 ²	66 ¹	52.86	47.14	26 ⁹	18.05
Total	3041	1375	...	...	730	628	...	...	173 ¹⁰	...
Average .....	...	...	2.21	45.21	...	...	53.75	46.25	...	12.58

¹ One set of twins.² Two sets of twins.³ Three sets of twins.⁴ Three calves unknown sex.⁵ Four calves unknown sex.⁶ Six calves unknown sex.⁷ Two calves unknown sex.⁸ One calf unknown sex.⁹ Seven calves unknown sex.¹⁰ Forty-seven calves unknown sex.

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